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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/928,523	08/13/2001	Tomohiko Shibata	782_181	8032
25191	7590	12/08/2004	EXAMINER	
BURR & BROWN PO BOX 7068 SYRACUSE, NY 13261-7068			SONG, MATTHEW J	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 12/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/928,523

Applicant(s)

SHIBATA ET AL.

Examiner

Matthew J Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 8-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 8 recites, "a space between the inner reactor and the outer reactor being evacuated and maintained in vacuum" in lines 6-7. There is no support in the instant specification for the space is evacuated and maintained in vacuum. Applicants' refer to paragraph [0054] and [0057] for support, however the cited portions of the specification do not teach maintaining the space in vacuum or evacuating the space. Furthermore, the specification does not use the term "vacuum".

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vaudo et al (US 6,533,874) in view of Yoshida et al (JP 2-34592), an English Translation has been provided, and further in view of Mayeda (US 5,614,249) or Kim et al (US 5,728,940).

Vaudo et al discloses an apparatus for growing a (Ga,Al,In) nitride on a substrate using Hydride vapor phase epitaxy (HVPE) (Abstract). Vaudo et al discloses the HVPE reactor **52** is provided with feed ports **72**, **74**, **76** and **78**, HCl is introduced to the reactor in feed ports **72**, **76'**, and **78'** (col 10, ln 1-67) and a substrate **56**. Vaudo et al also teaches feed port **74** accommodates the introduction of ammonia or other nitrogen species into the reactor in the direction and a vessel **67** of molten aluminum is provided in gas flow communication with feed port **76** (col 11, ln 1-40). Vaudo et al also teaches the growth of Al-containing nitride compounds such as AlN and AlGa<sub>3</sub>N is complicated and to circumvent problems the entire growth reactor and or reactor liner which are employed should be constructed of alternative high temperature compatible materials, such as sapphire or graphite (col 11, ln 40-67). Vaudo et al also discloses a multi-zoned hot-wall reactor, where the temperature of the molten metals is independently controlled

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and temperatures of 1000-1400°C are employed (col 12, ln 1-15). Vaudo et al discloses aluminum chloride is transported to a deposition zone, this reads on applicant's downstream zone, where it reacts with ammonia to form AlN (col 11, ln 15-25). Vaudo et al discloses a vessel 67, this reads on applicant's material holder and upstream zone, and a substrate holder 60

Vaudo et al does not teach an inner reactor and outer reactor being spaced from one another.

In an apparatus for forming single crystals, Yoshida et al teaches a quartz liner 18 spaced apart from a quartz ampoule 11, this reads on applicant's inner and outer reactor being spaced from one another (Translation pg 5 and Figs 1 and 2). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Vaudo et al with Yoshida et al's quartz liner because a liner tube between a reactor and a heater ensures uniform heating of the reactor.

The combination of Vaudo et al and Yoshida et al teaches a space between the inner and outer reactor, however the combination of Vaudo et al and Yoshida et al is silent to the space between the inner reactor and the outer reactor being evacuated and maintained in vacuum. Yoshida et al teaches the quartz ampoule 11 has a vacuum formed in its interior (Translation pg 5) and a liner tube surrounding the ampoule. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Vaudo et al and Yoshida et al by evacuating the space between the ampoule and liner and maintaining a vacuum to equilibrate the pressure between the ampoule and the liner to prevent compression of the ampoule.

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The combination of Vaudo et al and Yoshida et al does not teach a gas leak detecting means.

In an apparatus for detecting a leak in a chemical vapor deposition, note entire reference, Mayeda teaches a deposition apparatus with a plurality of access channels for a test gas, which allows specific leak testing at selected points in the apparatus (col 2, ln 20-67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Vaudo et al and Yoshida et al with Mayeda's leak detection system between the reactor and reactor liner to prevent damage by detecting leaks from the ampoule ('249 col 1, ln 45-67).

In an apparatus for detects leaks in a semiconductor device, note entire reference, Kim et al teaches a leakage gas detector 11 installed in the semiconductor manufacturing device for detecting the leakage of a reaction gas used in a semiconductor device manufacturing process (col 1, ln 1-67). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Vaudo et al and Yoshida et al with Kim et al's leakage detector between the reactor and reactor liner to increase the lifespan of the apparatus and prevent explosions by detecting leaks from the ampoule (col 1, ln 15-30).

Referring to claims 9-11, the combination of Vaudo et al, Yoshida et al and Kim et al or the combination of Vaudo et al, Yoshida et al, and Mayeda et al teach all of the structural limitations of claims 9-11. Claims 9-11 also contain method limitations, which are considered intended use and the apparatus taught by the combination of Vaudo et al, Yoshida et al, and Kim et al or the combination of Vaudo et al, Yoshida et al, and Mayeda et al would inherently be capable of performing the claimed intended use of the apparatus.

*Response to Arguments*

5. Applicant's arguments, see page 9 of the remarks, filed 9/15/2004, with respect to Nakamura have been fully considered and are persuasive. The rejection of claim 8-11 has been withdrawn. Nakamura teaches flowing hydrogen gas through the space between the reactor and reactor liner (Fig 5). Nakamura does not teach or suggest the space being evacuated and maintained in vacuum.

6. Applicant's arguments, see page 6 of the remarks, filed 9/15/2004, with respect to Dentai et al have been fully considered and are persuasive. The rejection of claim 8-11 has been withdrawn. Dentai et al teaches the reactor liner and reactor are in communication with each other; therefore Dentai et al does not a space between the reactor liner and reactor which is evacuated and maintained in vacuum.

7. Applicant's arguments with respect to claims 8-11 have been considered but are moot in view of the new ground(s) of rejection.

8. Applicant's arguments filed 9/15/2004 have been fully considered but they are not persuasive.

Applicants' argument that Kim nor Mayeda teach a gas leak detection means that detects gas leaks in a space between inner and outer reactors is noted but is not found persuasive. The

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Examiner admits Kim nor Mayeda teach a gas leak detection means between inner and outer reactors because Kim nor Mayeda teaches an inner or outer reactor. However, the Examiner maintains that based on Kim or Mayeda's teachings a person of ordinary skill in the art would have found it obvious to place the gas leak detection means between the inner and outer reactors. Mayeda teaches an apparatus for detecting gas leaks at selected points in a deposition apparatus (col 2, ln 20-40) and Kim teaches a leakage gas detector in a semiconductor device manufacturing apparatus. A person of ordinary skill in the art at the time of the invention would have realized the reaction gases are contained in the ampoule 11 and would have found it desirable to place the leak detection apparatus between the reactor and the reactor liner to detect a possible leak at the earliest possible time.

### *Conclusion*

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kang et al (US 6,197,683) teaches a metal source gas is mixed with a carrier gas such as Ar or N<sub>2</sub> to provide a smooth flow into a deposition chamber (col 6, ln 5-35).

Usui et al (JP 2000-91234) teaches HCl is supplied from an introducing pipe with a carrier gas in a HVPE process (Abstract).

Radhakrishnan (US 5,650,361) teaches an AlN chamber used for the deposition of AlN films (col 4, ln 1-15 and Abstract).



Razeghi et al (US 6,271,104) teaches all surface of a growth reaction chamber are coated with a barrier coating capable of withstanding high temperatures and not reacting with the reactants and the coating is preferably AlN (col 3, ln 15-50).

Molnar (US 6,086,673) teaches a HVPE apparatus, note Fig 1.

Ueda et al (US 6,117,213) teaches a HVPE apparatus using to form AlN (col 3).

Vaudo et al (US 6,596,079) teaches reactor liner can be used and replaced to improve reactor cleanliness and/or usable lifetime (col 11, ln 35-50).

Kawase et al (US 4,382,776) teaches a liner tube must be provided in the gap between a processing tube and a heater, so as to ensure uniform heating of the tube (col 1, ln 5-65).

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Matthew J Song  
Examiner  
Art Unit 1765

MJS

NADINE G. NORTON  
SUPERVISORY PATENT EXAMINER  
